

interface 66 for connecting to the display 14. Likewise, the computer 10 includes a port and/or interface 68 for interconnection with the user input device 40. The computer 10 may also contain a port, an infrared port for example, for wireless connection to the user input device(s). The computer 10 further includes a port and/or interface assembly 70, which interfaces the tracking system's cameras 16 with the tracking software.

The one-time-use digital medium 50, in the preferred embodiment is a mini-diskette, which includes information useful for a specific surgical application. The medium contains an area for high-level graphics processing software 72 with the most recently revised algorithms for the graphics processes which are specific to the selected surgical procedure. The disks for different surgical procedures may have different high-level graphics processing software and information. The high-level graphics processing software 72 interacts with the low-level graphic processing software 60 to enable the computer 10 to perform the image and graphics processing which it may be called upon to perform during the selected surgical procedure. Various other electronic keys, including media such as CD-ROM and DVD for example, for enabling the computer 10 for image guided surgery are also contemplated.

The digital medium 50 further includes an area 74 for software which describes tool specifications. That is, software to describe the specifications of each of the tools, probes, guides, and any other necessary accessories in the kit. In conjunction with the tool(s) physical specifications, markers 32, and the tracking system's cameras 16, the image guided surgery software recognizes the tool and correlates its position, trajectory, end point, and any other necessary characteristics in physical space with it's virtual representation on the display 14.

The digital medium 50 further includes an area 76 for 3D virtual representations, images, or information,

in VRML format for example, of the instrumented tools contained in the kits. These files are used to create 3D virtual representations of each of the surgical tools. The 3D representations of the tools are superimposed on
5 each acquired and registered image. These representations can be in wireframe or fully rendered format, for example, depending on the surgeon's preference. The 3D surgical tool information or image area 76 is accessed by the software on the computer and the digital medium and
10 manipulated so the tools virtual representation in the image(s) is correlated to its 3D position in physical space as determined by the camera(s) 16.

The digital medium 50 further includes an area
15 78 for software that describes other information such as instructions with guides concerning common steps taken during the surgical procedure. For example, this section may include software information concerning the depth and diameter of the holes to be tapped for the surgical screws in the kit. It may include information or guidelines for
20 the use or placement of the accessories in the kit, images from a previous or similar procedure, anatomy atlas tables containing information on certain anatomical angles and distances specific to an application, and the like. This portion of the digital medium 50 may also include software
25 for upgrading the low-level graphics processing software 60 to the latest released revision.

The invention further includes a means 80 to ensure one-time-use of the digital medium 50. This means preferably resides in the computer 10. In one embodiment,
30 this means erases all or part of the digital medium at the end of the procedure. Alternately, the software is encrypted to block reuse. In another embodiment, the digital medium 50 is physically deformed to prevent reuse. After the procedure, the tools and the digital medium 50
35 are disposed. Alternatively, the tool and the medium 50 are returned to the company for inspection, remanufacture, cleaning, sterilization, and/or repackaging.

Alternatively, the digital medium can also be used to store data obtained during surgery i.e., notes, images, etc. In this case, the digital medium 50 is archived.

In a preferred marketing procedure, the computer 10 is of limited cost. The computer 10 is sold to the hospitals at nominal or no cost. The cost of the computer 10 is recovered by the sale of the single use kits 20, the price of which is gauged to cover the cost of maintaining the computer 10 as well as the tools and accessories. This business model eliminates the traditional capital equipment sale process for conventional image guided surgery equipment. It also facilitates patient billing.

The invention has been described with reference to the preferred embodiment. Obviously, modifications and alterations will occur to others upon reading and understanding the preceding detailed description. It is intended that the invention be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.